COVER SHEET

Responsible Agency: United States Department of Energy

Cooperating Agency: Tennessee Valley Authority

Title: Final Environmental Impact Statement for the Production of Tritium in a Commercial Light Water Reactor

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Abstract: The U.S. Department of Energy (DOE) is responsible for providing the nation with nuclear weapons and ensuring that these weapons remain safe and reliable. Tritium, a radioactive isotope of hydrogen, is an essential component of every weapon in the current and projected U.S. nuclear weapons stockpile. Unlike other materials utilized in nuclear weapons, tritium decays at a rate of 5.5 percent per year. Accordingly, as long as the nation relies on a nuclear deterrent, the tritium in each nuclear weapon must be replenished periodically. Currently the U.S. nuclear weapons complex does not have the capability to produce the amounts of tritium that will be required to continue supporting the nation's stockpile. The *Final Programmatic Environmental Impact Statement for Tritium Supply and Recycling* (Final Programmatic EIS), DOE/EIS-0161, issued in October 1995, evaluated the alternatives for the siting, construction, and operation of tritium supply and recycling facilities at five DOE sites for four different production technologies. This Programmatic EIS also evaluated the impacts of using a commercial light water reactor (CLWR) without specifying a reactor location. In the Record of Decision for the Final Programmatic EIS (60 FR 63878), issued December 12, 1995, DOE decided to pursue a dual-track approach on the two most promising tritium supply alternatives: (1) to initiate purchase of an existing commercial reactor (operating or partially complete) or reactor irradiation services; and (2) to design, build, and test critical components of an accelerator system for tritium production. At that time, DOE announced that the final decision would be made by the Secretary of Energy at the end of 1998.

On December 22, 1998, Secretary of Energy Bill Richardson announced that the CLWR would be DOE's primary option for tritium production, and the proposed linear accelerator at the Savannah River Site would be the back-up option. The Secretary designated the Tennessee Valley Authority's (TVA) Watts Bar and Sequoyah Nuclear Plants as the Preferred Alternative for CLWR tritium production. The Secretary's announcement that the CLWR would be the primary tritium supply technology reaffirms the 1995 Record of Decision for the Final Programmatic EIS to construct and operate a new tritium extraction capability at the Savannah River Site.

This *Environmental Impact Statement for the Production of Tritium in a Commercial Light Water Reactor* (CLWR EIS) evaluates the environmental impacts associated with producing tritium at one or more of the following five CLWRs: (1) Watts Bar Nuclear Plant Unit 1 (Spring City, Tennessee); (2) Sequoyah Nuclear Plant Unit 1 (Soddy Daisy, Tennessee); (3) Sequoyah Nuclear Plant Unit 2 (Soddy Daisy, Tennessee); (4) Bellefonte Nuclear Plant Unit 1 (Hollywood, Alabama); and (5) Bellefonte Nuclear Plant Unit 2 (Hollywood, Alabama). Specifically, this EIS analyzes the potential environmental impacts associated with fabricating tritium-producing burnable absorber rods (TPBARs); transporting nonirradiated TPBARs from the fabrication facility to the reactor sites; irradiating TPBARs in the reactors; and transporting irradiated TPBARs from the reactors to the proposed tritium extraction facility at the Savannah River Site in South Carolina.

The public comment period on the CLWR Draft EIS extended from August 28 to October 27, 1998. During the comment period, public hearings were held in North Augusta, South Carolina; Rainsville, Alabama; and Evensville, Tennessee. An additional public meeting was held in Evensville, Tennessee, on December 14, 1998. The CLWR Draft EIS was made available through mailings and requests to DOE's CLWR Office and at DOE's Public Reading Rooms. In preparing the CLWR Final EIS, DOE considered comments received via mail, fax, submission at public hearings, recorded telephone messages, and the Internet. In addition, comments and concerns identified during discussions at the public hearings were recorded by a court reporter and were transcribed for consideration by DOE.

The CLWR Final EIS contains revisions and new information in response to the comments on the CLWR Draft EIS and technical details disclosed since the Draft EIS was issued. These revisions and new information are indicated by a double underline for minor word changes or by a sidebar in the margin for sentence or larger changes. Volume 2 (Comment Response Document) of the CLWR Final EIS contains the comments received during the public review of the CLWR Draft EIS and DOE's responses to these comments.

No sooner than 30 days after the notice of filing this EIS with the U.S. Environmental Protection Agency, DOE expects to issue a Record of Decision.

PREFACE

The *Final Programmatic Environmental Impact Statement for Tritium Supply and Recycling* (Final Programmatic EIS) (DOE/EIS-0161), which was completed in October 1995, assessed the potential environmental impacts of technology and siting alternatives for the production of tritium for national security purposes. On December 5, 1995, DOE issued a Record of Decision for the Final Programmatic EIS that selected the two most promising alternative technologies for tritium production and established a dual-track strategy that would, within 3 years, select one of those technologies to become the primary tritium supply technology. The other technology, if feasible, would be developed as a backup tritium source. Under the dual-track strategy, DOE would: (1) initiate the purchase of an existing commercial reactor (operating or partially complete) or irradiation services with an option to purchase the reactor for conversion to a defense facility; and (2) design, build, and test critical components of an accelerator system for tritium production. Under the Final Programmatic EIS Record of Decision, any new facilities that might be required, i.e., an accelerator and/or a tritium extraction facility to support the commercial reactor alternative, would be constructed at DOE's Savannah River Site in South Carolina.

The Final Programmatic EIS described a two-phase strategy for compliance with the National Environmental Policy Act (NEPA). The first phase included completion of the Final Programmatic EIS and subsequent Record of Decision. The second phase included the preparation of site-specific NEPA documents tiered from the Final Programmatic EIS. These EISs address the environmental impacts of specific project proposals. As a result of the Final Programmatic EIS and the Record of Decision, DOE determined to prepare three site-specific EISs: the *Environmental Impact Statement, Accelerator Production of Tritium at the Savannah River Site* (APT) (DOE/EIS-0270), the *Environmental Impact Statement for the Production of Tritium in a Comercial Light Water Reactor* (CLWR) (DOE/EIS-0288), and the *Environment Impact Statement, Construction and Operation of a Tritium Extraction Facility at Savannah River Site* (TEF) (DOE/EIS-0271). Each of these EISs presents an analysis of alternatives which do not affect the alternatives in the other EISs, with one exception. This exception is one alternative in the TEF EIS which would require the use of space in the APT. For this alternative to be viable, the APT would have to be selected as the primary source of tritium.

On December 22, 1998, Secretary of Energy Bill Richardson announced that commercial light water reactors (CLWR) will be the primary tritium supply technology. The Secretary designated the Watts Bar Unit 1 reactor near Spring City, Tennessee, and the Sequoyah Units 1 and 2 reactors near Soddy-Daisy, Tennessee, as the preferred commercial light water reactors for tritium production. These reactors are operated by the Tennessee Valley Authority (TVA), an independent government agency. The Secretary designated the APT as the "backup" technology for tritium supply. As a backup, DOE will continue with developmental activities and preliminary design, but will not construct the accelerator. Finally, selection of the CLWR reaffirms the December 1995 Final Programmatic EIS Record of Decision to construct and operate a new tritium extraction capability at the Savannah River Site.

DOE has completed the final EISs for the APT, CLWR, and TEF. No sooner than 30 days after publication in the *Federal Register* of the Environmental Protection Agency's Notice of Availability of the final EISs for APT, CLWR, and TEF, DOE intends to issue a consolidated Record of Decision to: (1) formalize the programmatic announcement made on December 22, 1998; and (2) announce project-specific decisions for the three EISs. These decisions will include, for the selected CLWR technology, the selection of specific CLWRs to be used for tritium supply and the location of a new tritium extraction capability at the Savannah River Site. For the backup APT technology, technical and siting decisions consistent with its backup role will be made.

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ACRONYMS AND ABBREVIATIONS

APT	Accelerator Production of Tritium
BEIR	Biological Effects of Ionizing Radiation
Bellefonte 1	Bellefonte Nuclear Plant Unit 1
Bellefonte 2	Bellefonte Nuclear Plant Unit 2
CFR	Code of Federal Regulations
CLWR	Commercial light water reactor
DOE	U.S. Department of Energy
EIS	Environmental impact statement
EPA	U.S. Environmental Protection Agency
FR	Federal Register
HEPA	High-efficiency particulate air
IAEA	International Atomic Energy Agency
ISFSI	Independent spent fuel storage installation
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
OSHA	Occupational Safety and Health Administration
P.L.	Public Law
Sequoyah 1	Sequoyah Nuclear Plant Unit 1
Sequoyah 2	Sequoyah Nuclear Plant Unit 2
START	Strategic Arms Reduction Treaty
TPBAR	Tritium-producing burnable absorber rod
TVA	Tennessee Valley Authority
U.S.C.	United States Code
Watts Bar 1	Watts Bar Nuclear Plant Unit 1
Watts Bar 2	Watts Bar Nuclear Plant Unit 2